

YERSINIOSIS

Infection with Yersinia species, other than Y. pestis

DISEASE REPORTING

In Washington

DOH receives 30 to 39 reports of yersiniosis per year.

Purpose of reporting and surveillance

- To identify sources of transmission (e.g., a commercial product) and to prevent further transmission from such sources.
- When the source is a risk for only to a few individuals (e.g., home cooked pork), to inform those individuals how they can reduce their risk of exposure.

Reporting requirements

- Health care providers: notifiable to Local Health Jurisdiction within 3 work days
- Hospitals: notifiable to Local Health Jurisdiction within 3 work days
- Laboratories: no requirements for reporting
- Local health jurisdictions: notifiable to DOH Communicable Disease Epidemiology within 7 days of case investigation completion or summary information required within 21 days

CASE DEFINITION FOR SURVEILLANCE

Clinical criteria for diagnosis

A febrile diarrheal illness. A typical clinical presentation may include fever, diarrhea and abdominal pain, but some patients with mesenteric lymphadenitis may present with abdominal pain alone. Reactive arthritis, exudative pharyngitis and septicemia may occur.

Laboratory criteria for diagnosis

- Isolation of *Y. enterocolitis* or *Y. pseudotuberculosis* from stool, urine, or a normally sterile site.

Case definition

- Probable: A case with the typical clinical presentation that is not laboratory confirmed, and is not epidemiologically linked to a confirmed case.
- Confirmed: A case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed case.

A. DESCRIPTION

1. Identification

An acute bacterial enteric disease typically manifested by acute febrile diarrhea (especially in young children), enterocolitis, acute mesenteric lymphadenitis mimicking appendicitis (especially in older children and adults), complicated in some cases by erythema nodosum (in about 10% of adults, particularly women), postinfectious arthritis and systemic infection; caused by either of two agents, *Yersinia enterocolitica* or *Y. pseudotuberculosis*. Bloody diarrhea is reported by up to 1/4 of patients with *Yersinia enteritis*. Whereas infection with either *Y. enterocolitica* or *Y. pseudotuberculosis* can result in clinical illness, most reported cases are caused by *Y. enterocolitica*. *Y. pseudotuberculosis* has been linked primarily with mesenteric adenitis, although a syndrome of enteritis in children (Izumi fever) has been reported in Japan.

Diagnosis is usually made by stool culture. Cefsulodin irgasan novobiocin (CIN) medium is highly selective and should be used if there is reason to suspect infection with *Yersinia*; it permits identification in 24 hours at 32°C (89.6°F) without cold enrichment. With precautions to prevent overgrowth of fecal flora, the organisms can be recovered on usual enteric media. Cold enrichment in buffered saline at 4°C (39°F) for 2-3 weeks can be used to select for these organisms; however, the sensitivity of the technique may result in identification of very small numbers of organisms that are of uncertain clinical significance. *Yersinia* can be isolated from blood with standard commercial blood culture media. Serologic diagnosis is possible by an agglutination test or by ELISA, but its availability is generally limited to research settings.

2. Infectious Agent

Gram-negative bacilli. *Y. pseudotuberculosis* comprises 6 serotypes with 4 subtypes; >90% of infections in humans and animals are O-group I strains. *Y. enterocolitica* comprises over 50 serotypes and 5 biotypes, many of which are nonpathogenic. Strains pathogenic for humans are generally pyrazinamidase negative; this includes strains in serotypes O3, O8, O9, and O5,27, and biotypes 1, 2, 3 and 4. Serotypes causing disease may vary in different geographic areas; types O3, O9 and O5,27 account for most of the cases in Europe. Type O8 strains had been responsible for most outbreaks in the US; however, type O3 has emerged in the 1990s as the most common serotype in the US.

3. Worldwide Occurrence

Worldwide. *Y. pseudotuberculosis* is primarily a zoonotic disease of wild and domesticated birds and mammals, with humans an incidental host. *Y. enterocolitica* has been recovered from a wide variety of animals that show no signs of disease. The most important source of infection may be pork, as the pharynx of pigs may be heavily colonized by *Y. enterocolitica*. Since the 1960s, *Yersinia* have been recognized as etiologic agents of gastroenteritis (as high as 1%-3% of acute enteritis in some areas) and mesenteric lymphadenitis. Approximately 2/3 of *Y. enterocolitica* cases occur among infants and

children; 3/4 of *Y. pseudotuberculosis* cases are aged 5 to 20 years. Human cases have been reported in association with disease in household pets, particularly sick puppies and kittens.

The highest isolation rates have been reported during the cold season in temperate climates, including northern Europe (in particular, Scandinavia), North America and temperate regions of South America. Vehicles implicated in outbreaks attributed to *Y. enterocolitica* have included soybean cake (tofu) and pork chitterlings (pig large intestines). In the US some outbreaks with milk (including pasteurized milk) as the vehicle have occurred. However, where pasteurized milk was implicated, it was believed to be due to postpasteurization contamination rather than resistance of the agent to the pasteurization process. Studies in Europe suggest that many cases are related to ingestion of raw or undercooked pork. Since 20% of infections in older children and adolescents can mimic acute appendicitis, outbreaks can sometimes be recognized by local increases in appendectomies.

4. Reservoir

Animals are the principal reservoir for *Yersinia*. The pig is the principal reservoir for pathogenic *Y. enterocolitica*; asymptomatic pharyngeal carriage is common in swine, especially in the winter. *Y. pseudotuberculosis* is widespread among many species of avian and mammalian hosts, and particularly among rodents and other small mammals.

5. Mode of Transmission

Fecal-oral transmission takes place by eating and drinking contaminated food and water or by contact with infected people or animals. *Y. enterocolitica* has been isolated from a variety of foods; however, pathogenic strains are most commonly isolated from raw pork or pork products. In the US, chitterlings are a common source of infection; in Europe, cases have been significantly associated with feeding of raw pork to infants. In contrast to many other foodborne pathogens, *Y. enterocolitica* is able to multiply under refrigeration and microaerophilic conditions. Thus, there is an increased risk of infection by *Y. enterocolitica* if uncured meat stored in evacuated plastic bags is undercooked. *Y. enterocolitica* has been recovered from natural bodies of water in the absence of *Escherichia coli* organisms. Nosocomial transmission has been reported, as has transmission by transfusion of stored blood from donors who were asymptomatic or had mild GI illness.

6. Incubation period

Probably 3-7 days, generally under 10 days.

7. Period of communicability

Secondary transmission appears to be rare. There is fecal shedding at least as long as symptoms exist, usually for 2-3 weeks. Untreated cases may excrete the organism for 2-3 months. Prolonged asymptomatic carriage has been reported in both children and adults.

8. Susceptibility and resistance

Gastroenterocolitis (diarrhea) is more severe in children, whereas postinfectious arthritis is more severe in adolescents and older adults. *Y. pseudotuberculosis* exhibits a predilection for male adolescents, while *Y. enterocolitica* attacks both genders equally. Reactive arthritis and the Reiter syndrome have a predilection for people with the HLA-B27 genetic type. Septicemia occurs most often among people with iron overload (e.g., hemochromatosis) or those with underlying immunosuppressive illness or therapy.

B. METHODS OF CONTROL

1. Preventive measures:

- a. Prepare meat and other foods in a sanitary manner, avoid eating raw pork and pasteurize milk; irradiation of meat is effective.
- b. Wash hands prior to food handling and eating, after handling raw pork and after animal contact.
- c. Protect water supplies from animal and human feces; purify appropriately.
- d. Control rodents and birds (for *Y. pseudotuberculosis*).
- e. Dispose of human, dog and cat feces in a sanitary manner.
- f. During the slaughtering of pigs, the head and neck should be removed from the body to avoid contaminating meat from the heavily colonized pharynx.

2. Control of patient, contacts and the immediate environment:

- a. Report to local health authority.
- b. Isolation: Enteric precautions for patients in hospitals. Remove those with diarrhea from food handling, patient care and occupations involving care of young children.
- c. Concurrent disinfection: Of feces. In communities with modern and adequate sewage disposal systems, feces can be discharged directly into sewers without preliminary disinfection.
- d. Quarantine: None.
- e. Immunization of contacts: None.
- f. Investigation of contacts and source of infection: A search for unrecognized cases and convalescent carriers among contacts is indicated only when a common-source exposure is suspected.
- g. Specific treatment: Organisms are sensitive to many antibiotics, but are generally resistant to penicillin and its semisynthetic derivatives. Therapy may be helpful for GI symptoms; definitely indicated for septicemia and other invasive disease. Agents of choice against *Y. enterocolitica* are the aminoglycosides (for septicemia only) and TMP-SMX. Newer quinolones such as ciprofloxacin may also be effective. Both *Y. enterocolitica* and *Y. pseudotuberculosis* are usually sensitive to the tetracyclines.

3. Epidemic measures

- a. Any group of cases of acute gastroenteritis or cases suggestive of appendicitis should be reported at once to the local health authority, even in the absence of specific identification of the etiology.
- b. Investigate general sanitation and search for common-source vehicle; pay attention to consumption of (or possible cross contamination with) raw or undercooked pork; also look for evidence of close contacts with animals, especially pet dogs, cats and other domestic animals.

4. International measures

None.

